

# FOCUS

January  
2002

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## Highway Infrastructure: Protecting the Nation's Investment

*By King W. Gee*

With an Interstate system that spans more than 67,000 km (42,000 mi) and many thousands more miles of local and State roads from coast to coast, mobility is crucial to our country's well-being and quality of life. Whether it means being able to get to work, to take a family vacation, or to ship goods from one State to another, both citizens and businesses alike expect safe and reliable roads. A sound infrastructure is the backbone that provides this reliability.

A sound transportation infrastructure requires care and maintenance, however. The Federal Highway Administration's (FHWA) Office of Infrastructure is working with our partners in State and local highway agencies and industry to promote a range of initiatives aimed at maintaining and enhancing our highway system, increasing safety, and reducing congestion. One key to a better system and reduced congestion is managing construction and maintenance work zones more effectively. As a growing portion of the State highway system reaches the end of its initial service life, work zones are a fact of life across the country. But all work zones are not created equal: Highway agencies are demonstrating that innovative practices can reduce the impact of road work. These practices include using temporary road closures to complete work faster, enhancing public information

programs that encourage motorists to use alternate routes during construction, and using such innovative contracting practices as design-build, warranties, and incentives/disincentives to encourage better quality control and faster work. We know that our customers want us to "get in, get out, and stay out," and more highway agencies are accomplishing this task.

Even better than a well-managed work zone, however, is not needing a work zone at all. As an increasing number of highway agencies introduce longer lasting high-performance materials, less disruptive preservation and maintenance work will be required.

Bridges that are being built with high-performance concrete (HPC), for example, are expected to last significantly longer than conventional bridges in certain environments. HPC is made using the same basic materials as conventional concrete, but the proportions and curing conditions are engineered to produce concrete mixes that meet the requirements of

specific bridge projects and thus provide a more durable, higher-performing structure. The adoption of HPC is being aided by FHWA's Innovative Bridge Research and Construction Program, which provides funding to help State and local transportation agencies use innovative materials for bridge repair, rehabilitation, replacement, and construction.

**Mobility is  
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U.S. Department  
of Transportation

**Federal Highway  
Administration**

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# North Carolina Takes a New Approach to Financing Road Maintenance

aced with a problem confronting many States—where to find money to maintain highways—

North Carolina turned to a process known as cash flow financing, or cash management, to obtain the needed funds. As part of the process, North Carolina's General Assembly passed a special provision in September 2001 authorizing the State Department of Transportation (DOT) to use \$470 million in State Highway Trust Fund cash balances to restore primary routes that range from fair or poor condition to good condition.

Although North Carolina is only 11th in the Nation in population, it has the second largest State-maintained road system at 126,000 km (78,000 mi). More than 23,000 km (14,000 mi) of the system are primary highways carrying 60 percent of vehicle miles traveled in the State. Forty-one percent of the State's road system is currently rated at "fair" or "poor." Because it was crucial to improve safety and mobility for North Carolina's drivers, the State budget bill (SB1005) directed a portion of the Highway Trust Fund's cash balance to be spent on pavement preservation efforts, which include the strengthening, shoulder widening, and resurfacing of the State's primary (non-Interstate) highway system. In all, \$150 to \$170 million has been allocated each year for 3 years to North Carolina's 14 highway divisions for needed road work.

Essentially, cash flow financing allows State DOTs to tap into funds to which they previously did not have access; in North Carolina's case, it took a legislative act to free up money for pavement preservation. At the end of the 1999-2000 fiscal year, the Highway Trust Fund had reserves of \$858 million and the Highway Fund had a cash

balance of \$270 million. The State's Joint Legislative Oversight Committee, seeking to divert some of that money into projects that could immediately help fulfill the State's highway maintenance needs, contracted with Dye Management Group, Inc., of Bellevue, Washington, to study the matter. Dye recommended that North Carolina use the cash balance for road repair projects if the General Assembly passed legislation making the funds available. According to Dye's David Rose, "This idea is not unique in that several other States have done it in recent years. However, the approach isn't foolproof—States must implement sound financial management and planning or else run the risk of depleting highway funds."

The North Carolina legislation directs the DOT to use "cash flow financing to the maximum extent possible to fund highway construction projects" and addresses the inherent risks by mandating a number of controls, including the establishment of a financial planning committee, monthly financial reports, fund cash level targets, revenue forecasting procedures, reorganization of preconstruction functions to expedite project delivery and maximize use of cash flow financing of projects, and the designation of a person to be responsible for project delivery. The law also empowers the State Treasurer to combine the balances of the Highway Trust Fund and the Highway Fund and to make short-term loans between the Funds to facilitate cash flow financing.

In addition to the \$470 million to be used for primary route pavement preservation, the legislation specifies two other smaller provisions: \$15 million per year for 3 years is to be used for the planning and design of projects so that money can be

saved over the long run in maintenance costs. And another \$15 million per year for 3 years is designated for installing electronic signal and traffic management systems that will improve the operational efficiency of the State's road system by reducing delays and facilitating traffic flow. The new provisions also stipulate that the DOT must ensure that improvements made using cash balance funds will not interfere with the delivery of Highway Trust Fund projects on the 2002-2008 Transportation Improvement Program schedule.

In an announcement of the special provision, North Carolina Transportation Secretary Lyndo Tippet called the law a "landmark" move that is "undoubtedly the most significant transportation legislation since the Highway Trust fund in 1989." In illustrating the importance of the provision, Tippet added, "Under [the previous] funding system, it might be 10 to 20 years before some of these roads would ever be resurfaced. In fact, some of these projects would not have been completed for many generations."

Quick to allocate the new funds, the DOT reports that \$115 million was let to contractors by the end of December 2001. These funds are allowing needed repairs to be made immediately to the State's primary roads, thus increasing safety and mobility for customers. Dye Management Group, Inc., is currently assisting the DOT in implementing new cash management procedures, developing forecasting tools, and making the transition to a cash-flow based program.

For more information, contact Len Sanderson, State Highway Administrator for North Carolina DOT, 919-733-7384 (email: lsanderson@dot.state.nc.us).

# In Brief...

## Highway Infrastructure, continued from page 1

The Long-Term Pavement Performance (LTPP) program will soon make available the updated LTPP resilient modulus testing start-up procedure, which directs labs on how to check their equipment before initiating resilient modulus tests. Advancements in testing equipment necessitated the procedural update. The updated procedure will be submitted for consideration to the American Association of State Highway and Transportation Officials. The procedure is expected to become standard practice and will be posted on the Web at [www.tfhrc.gov/pavement/ltp.htm](http://www.tfhrc.gov/pavement/ltp.htm). For more information, contact Jack Springer at FHWA, 202-493-3144 (fax: 202-493-3161; email: [jack.springer@fhwa.dot.gov](mailto:jack.springer@fhwa.dot.gov)).

Two demonstration projects on heat-straightening repairs for damaged steel bridges will be held February 12–13, 2002, in Anchorage, Alaska, and April 8–9, 2002, in Trenton, New Jersey. The projects are the latest in an ongoing series of FHWA heat-straightening demonstrations (see October 2001 *Focus*). For more information on the Alaska demonstration, contact Simon Howell at the Alaska Department of Transportation and Public Facilities, 907-451-5482 (email: [simon\\_howell@dot.state.ak.us](mailto:simon_howell@dot.state.ak.us)). More information on the New Jersey demonstration project can be obtained from Helene Cook of FHWA, 609-637-4230 (fax: 609-538-4913; email: [helene.cook@fhwa.dot.gov](mailto:helene.cook@fhwa.dot.gov)) or Jose Lopez of the New Jersey Department of Transportation, 609-530-2457 (email: [jose.lopez@dot.state.nj.us](mailto:jose.lopez@dot.state.nj.us)). Information can also be found on FHWA's heat straightening Web site at [www.fhwa.dot.gov/bridge/heat.htm](http://www.fhwa.dot.gov/bridge/heat.htm).



More highway agencies are accomplishing the task of "getting in, getting out, and staying out" of work zones.

Quality control and quality assurance programs also help to cut down on the time needed for maintenance and repairs. As more highway agencies embrace an asset management approach, which emphasizes the timely preservation, maintenance, and upgrading of highway assets through cost-effective planning and resource allocation decisions, an important byproduct is an increased focus on quality. Highway agencies are using pavement, bridge, and maintenance management systems, for example, to collect and monitor information on current conditions, forecast future conditions, and determine the best program of highway or bridge investments to pursue over a designated time period. The use of these systems will help agencies to maintain a steady level of performance and quality and optimize the use of limited highway resources.

A road's effective service life can also be extended through pavement preservation efforts, which involve the application of carefully selected surface treatments applied at the right time. The key is to apply the treatments when the pavement is still in relatively good condition, with no structural damage. It is estimated that the

use of pavement preservation treatments can extend the life of a pavement by 5 to 7 years. Ultimately, the less repair work that needs to be done, the less congestion and traffic disruption our customers will have to face. In addition to pavement preservation efforts, the use of such newer technologies as HIPERPAV, the Superpave system, and stone matrix asphalt is also central to achieving more durable pavements.

Over the long term, FHWA's and our partners' efforts to enhance pavement and bridge performance, improve safety, and cut congestion will be bolstered by the work of the Transportation Research Board's Future Strategic Highway Research Program (F-SHRP). Research areas being considered for F-SHRP study include achieving rapid, long-lived reconstruction of highways with minimum disruption and reducing user delay. The F-SHRP efforts, combined with the ongoing State and Federal emphasis, will be important in ensuring that the Nation's infrastructure continues to provide the safety and reliability that is so vital to our daily life.

*King W. Gee is the Program Manager for FHWA's Infrastructure Core Business Unit.*

# Champions of Highway Quality Honored

hampions for continuous quality improvements of America's highways were recognized at the National Partnership for Highway Quality's (NPHQ) awards banquet in Fort Worth, Texas, in November 2001. Winners in five categories were announced, including the 2001 "National Achievement" award honoree.

The NPHQ, a partnership among the Federal Highway Administration (FHWA), American Association of State Highway and Transportation Officials, and 10 industry organizations, presents the NPHQ "National Achievement" award every 2 years, while presenting the "Making a Difference" awards in intervening years. The "National Achievement" award recognizes the best State, county, or city highway, road, or street project that is completed in a timely, nondisruptive, and safe manner for roadway users.

This year, 26 States submitted nominations in the five achievement award categories:

- The National Achievement Award Winner
- Special Recognition of a Structure Project
- Special Recognition of a Small Project (under \$20 million)
- National "Gold Level" Projects
- State Award Winners

This year's "National Achievement" award winner, the Pennsylvania Department of Transportation (DOT), was recognized for its "22/renew" Expressway Improvement Project, a \$70 million reconstruction and renovation of a 13-km (8-mi) section of U.S. 22. The project included 12 bridge renovations, 5 interchange modifications, and deployment of an Intelligent Transportation System with ramp metering, variable message signs, and Highway Advisory Radio components.

Using innovative traffic management strategies, which included maintaining four lanes of traffic during peak traffic periods, compressing the construction schedule, and deploying a "real-time" traffic control and motorist advisory system, the Pennsylvania DOT managed to minimize delays on an urban expressway that carries an average of 85,000 vehicles a day. The Pennsylvania DOT also implemented a public information and involvement campaign to ensure the project's success. The campaign included launching a project-specific Web site and distributing more than 100,000 copies of an informative 22/renew "Survival Guide." These efforts resulted in 22/renew being completed on budget and 65 days ahead of schedule.

The "Structure Project" award went to the North Carolina DOT for the completion of the Neuse River Bridge in New Bern, North Carolina. This \$93 million project involved a series of 12 interconnecting bridges joining 2 major U.S. transportation routes and 1 State route. The Neuse River Bridge replaced the John Lawson Bridge, which presented navigational barriers and was unable to handle the increasing traffic load. The North

Carolina DOT worked closely with local interest groups and the Army Corps of Engineers to not only restore the surrounding wetlands as they built, but to maintain water quality for wildlife and enhance the view of the river at this popular tourist destination.

The Maryland State Highway Administration's (SHA) first large-scale utilization of the design-build process, the U.S. 113-Phase 1-Design Build project, earned the "Small Project" award. Working at the local level, the Maryland SHA strove to build trust and cooperation with a customer-focused approach for a project aimed at improving the infrastructure of an area experiencing rapid growth. Completed 18 months ahead of schedule, the project included innovations such as a streamlined permit process, creation of a flexible design adaptable to onsite modifications, and Maryland's first use of cement-amended fly ash. Successful efforts were made to preserve and complement the natural elements of the site, and adjacent natural marshes and ponds were used to assist in highway drainage and to protect the environmentally sensitive Coastal Bays watershed.

## NPHQ's "Making A Difference" Awards

The NPHQ is now accepting nominations for its 2002 "Making A Difference" awards. Teams that have successfully improved quality or customer service for a highway construction or maintenance project, highway maintenance program or activity, or a highway operation program or activity that meets the eligibility criteria specified for these awards, are invited to submit their accomplishments for consideration to the NPHQ. The awards, sponsored by the NPHQ Steering Committee, recognize projects and organizational teams that have excelled in the principles of quality improvement and promoting their initiatives for others to use to "make a difference" in the quality of our Nation's highways. Nominations must be received by May 1, 2002.

For more information, contact NPHQ Administrator Bob Templeton at 512-301-9899 (fax: 512-301-9897; email: btemplenphq@aol.com).

Eight States were recognized as NPHQ "Gold Level" winners (see sidebar). The Iowa DOT was recognized, for example, for its unique "Design Partnering" process, which was used to garner local support for improvements to U.S. 71. Local opposition to the project, which involved potential environmental risks, dated back to the 1960s. The Iowa DOT's innovative cooperative efforts resulted in the widening of a roadway that bisects lakes, small communities, and two cities. The construction of a new bridge in an environmentally sensitive area involved special erosion control measures to protect West Okoboji Lake, a rare deep-blue spring-fed lake. These successes were highlighted by the fact that the project finished a full construction season ahead of schedule.

Another "Gold Level" winner, the Kentucky Transportation Cabinet (TC), completed a bridge joint replacement project on a section of Interstate 65 in a record 107 hours. The project, located in Louisville, involved a section of highway that carries more than 133,000 vehicles a day. Such high volumes made it clear that traditional construction methods would cause major headaches to highway users and construction crews alike. Adopting a "Get In, Get Out, and Stay Out" philosophy, the contractors and the Kentucky TC created a six-point strategy that increased safety and avoided unnecessary inconvenience. This strategy included using such techniques as the whole-piece replacement process, which eliminates cold joints in the replaced concrete and asphalt and allows better compaction of the laid asphalt.

An additional 15 States (see sidebar) were recognized and showcased as "State Award" winners. An NPHQ Achievement Award Booklet highlighting all of the award winners is currently being developed.

The diverse 2001 award winners and nominees reflect NPHQ's goals, which include:

- Improving cooperation among industry; State, Federal, and local agencies; and academia.
- Regularly identifying customer needs through national and State surveys.
- Championing the development and implementation of strategies that address customer needs.
- Promoting safe highways and work zones through such means as identifying and publicizing best practices and innovations; encouraging education and training; and recommending improvements in benchmarking and evaluation.

For more information on NPHQ or its activities, contact Julie Trunk in FHWA's Office of Asset Management at 202-366-1557 (fax: 202-366-9981; email: [julie.trunk@fhwa.dot.gov](mailto:julie.trunk@fhwa.dot.gov)), or NPHQ Administrator Bob Templeton at 512-301-9899 (fax: 512-301-9897; email: [btemplenphq@aol.com](mailto:btemplenphq@aol.com)).

## 2001 NPHQ State Winners

Connecticut  
Delaware  
Florida  
Georgia  
Illinois  
Louisiana  
Minnesota  
Montana  
Nebraska  
New Jersey  
New Mexico  
South Carolina  
Utah  
Virginia  
Washington State

## 2001 NPHQ Gold Level Winners

Arizona  
Indiana  
Iowa  
Kansas  
Kentucky  
Michigan  
Oregon  
Texas



# International Conference Showcases Recycled Material Uses

rom recycling asphalt pavement to finding new uses for lead paint removed from steel bridges, the first international conference on the "Beneficial Use of Recycled Materials in Transportation Applications," held in Washington, DC, in November 2001, provided a broad forum for sharing best practices and innovations. The conference brought together more than 160 experts from 15 countries in North America, South America, Europe, and Asia to address the use of recycled materials generated from transportation, industrial, municipal, and mining processes in transportation applications. Event sponsors included the University of New Hampshire's Recycled Materials Resource Center (RMRC), Federal Highway Administration (FHWA), National Asphalt Pavement Association, National

Science Foundation, U.S. Department of Energy, Rubber Pavements Association, and the American Coal Ash Association.

The 3-day conference offered more than 130 technical presentations on topics such as programs, policy and analysis, materials applications and demonstrations, and evaluation methodologies. It also offered the opportunity to share ideas and experiences. "I appreciated the chance to talk to researchers from other countries and learn about their strategies for evaluating recycled and waste materials," says attendee Jeanne Hewitt of the New York State Department of Transportation (DOT).

A presentation on "Minnesota's Experience in Implementing the Use of Recycled Materials" made by Roger Olson, a Research Operations Engineer for the Minnesota DOT, explained the DOT's proactive stance on the use of recycled

materials in transportation applications. Minnesota's standard criteria for using recycled material is that it must be:

- Equal or better in engineering applications;
- Environmentally acceptable; and
- Equal or better in economic considerations.

"Minnesota has gone through the evolutionary process of evaluating recycled materials: the normal process of environmental assessment, laboratory evaluation, and finally field tests," says Olson. This process has, at times, led to the development of a market for a particular recycled material, as was the case of using recycled asphalt pavement in hot-mix asphalt.

Kevin Wideman, the Environmental Compliance Coordinator for the Missouri DOT, delivered a presentation on "Lead-Paint Recycling in Missouri," which described the DOT's innovative lead paint

removal techniques. Prior to 1990, paint removed from steel bridges was allowed to fall to the ground. When health and environmental concerns over this practice were identified, sand-blasted paint was then collected and stored in drums in landfills, with some bridges producing more than 100 drums of residue. In 1994, the Missouri DOT began recovering the lead through a smelting process

The FHWA Recycling Team recently completed work on an FHWA recycling policy, which clarifies the agency's longstanding support for the appropriate use of recycled materials in highway applications. The team now plans to embark on a series of reviews of state-of-the-practice operations and innovations. These reviews will focus on high-priority opportunities for using recycled materials in transportation projects, with an emphasis on dispelling misconceptions and eliminating unnecessary barriers to recycling. Understanding that there are many different materials that can be recycled for transportation purposes, the team decided to focus its resources on portland cement concrete for its 2002 campaign.

Even though recycled materials might not be appropriate for all applications, FHWA's Recycling Team recommends that they at least be considered at the earliest possible stage of every project, especially from the financial, engineering, and environmental aspects. To support this process, the team is planning to provide a "tool kit" that outlines recycling information resources, a recycling training course, and a cadre of speakers to discuss recycling at regional, National, and international conferences.

For more information on the work of the FHWA Recycling Team, contact Jason Harrington at FHWA, 202-366-1576 (email: k.jason.harrington@fhwa.dot.gov).

**Even though recycled materials might not be appropriate for all applications, FHWA's Recycling Team recommends that they at least be considered at the earliest possible stage of every project.**

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# Highway Technology Calendar

*The following events provide opportunities to learn more about products and technologies for accelerating infrastructure innovations.*

## **Sealer/Binder Workshop: Providing Early Protection**

March 1, 2002, Myrtle Beach, SC

This workshop will look at the effectiveness of sealers, rejuvenators, and binders for preserving a pavement's service life.

*Contact:* Steve Hersey, Foundation for Pavement Preservation, 703-610-9036 (fax: 703-610-9005; email: info@fp2.org; Web: fp2.org).

## **SMA in the USA Workshop**

March 25–27, 2002, Frederick, MD

This workshop will provide the latest technical and performance updates on Stone Matrix Asphalt (SMA) pavements in the United States. The workshop is sponsored by FHWA, Maryland State Highway Administration (SHA), Virginia Department of Transportation, Asphalt Pavement Alliance, International Society for Asphalt Pavements, and State asphalt pavement associations.

*Contact:* John Bukowski at FHWA, 202-366-1287 (email: john.bukowski@fhwa.dot.gov) or Gloria Burke at Maryland SHA, 800-477-7453 (email: gburke@sha.state.md.us).

## **Third International Symposium on 3D Finite Element for Pavement Analysis, Design, & Research**

April 2–5, 2002, Amsterdam,  
The Netherlands

The symposium will highlight new worldwide developments in the use of the 3D finite element method for investigating pavement structural problems.

*Contact:* Samir N. Shoukry at West Virginia University, 304-293-3111,

ext. 2367 (fax: 304-293-6689;  
email: samir.shoukry@mail.wvu.edu;  
Web: www.3dfem.org).

## **International Center for Aggregates Research (ICAR) 10th Annual Symposium**

April 14–17, 2002, Baltimore, MD

The symposium will feature discussion on asphalt concrete, bases, and fines. The event is being cosponsored by the Aggregates Foundation for Technology, Research, and Education and the National Stone, Sand, and Gravel Association.

*Contact:* ICAR at 512-471-4498  
(email: icar@mail.ce.utexas.edu;  
Web: www.ce.utexas.edu/org/icar).

## **Third National Seismic Conference and Workshop on Bridges and Highways**

April 28–May 1, 2002, Portland, OR

The conference will feature the latest research and developments in seismic engineering for bridges, highway systems, and components. The event is being sponsored by the Oregon Department of Transportation (DOT), Washington State DOT, and FHWA.

*Contact:* For registration information, contact Michael Higgins at Pure Technologies, 410-309-7050 (fax: 410-309-7051; email: mike.higgins@soundprint.com). For information on conference content, contact Roland Nimis at FHWA, 415-744-2653 (fax: 415-744-2620; email: roland.nimis@fhwa.dot.gov). Information can also be found on the Web at [mceer.buffalo.edu/meetings/3nsc/92701release.asp](http://mceer.buffalo.edu/meetings/3nsc/92701release.asp).

## **Nineteenth Annual International Bridge Conference**

June 10–12, 2002, Pittsburgh, PA

Current products, methods, and applications in the bridge industry will be discussed at the conference.

*Contact:* Engineers Society of Western Pennsylvania, 412-261-0710 (fax: 412-261-1606; email: conf@eswp.com).

## **Ninth International Conference on Asphalt Pavements**

August 17–22, 2002,  
Copenhagen, Denmark

The conference will address research and practice for the design, construction, maintenance, and performance of asphalt pavements.

*Contact:* DIS Congress Service  
Copenhagen A/S at  
isap2002@discongress.com  
(Web: [www.asphalt.org/calendar/copenhagen2.html](http://www.asphalt.org/calendar/copenhagen2.html)).

## **First International Conference on Scour of Foundations**

November 17–20, 2002,  
College Station, TX

The conference will cover such topics as bridge scour, erosion of soils, scour monitoring, numerical modeling, and international guidelines and practices.

*Contact:* Jean-Louis Briaud at Texas A&M University's Department of Civil Engineering, briaud@tamu.edu (fax: 979-845-6554; Web: [tti.tamu.edu/conferences/scour](http://tti.tamu.edu/conferences/scour)).

# FOCUS

*FOCUS* (ISSN 1060-6637) is published monthly by the U.S. Department of Transportation's Federal Highway Administration (FHWA).

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Publication No. FHWA-RD-02-006

## Recycling Conference,

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that resulted in the recycling of hundreds of tons of former waste and saving valuable landfill space.

In an effort to improve the paint removal process, the DOT purchased two abrasive recycler blasters in 1996. These machines remove lead paint with vacuum washers and magnetic separators that reduce blast residue by an estimated 80 percent. Instead of 50 drums from an average bridge, there are now only 6 to 10 drums of residue that require the smelting process. These and other developments have greatly reduced the cost of disposal and eliminated any long-term liability for the department.

A research needs session was held at the end of the conference that included a panel of experts from FHWA, the U.S. Environmental Protection Agency, American As-

sociation of State Highway and Transportation Officials, Association of State and Territorial Solid Waste Management Officials, and industry. The panel is currently working on a white paper that will help direct future efforts in recycled material research. The paper will be delivered to the National Science Foundation and Federal and State agencies.

A team is currently working on releasing the conference's proceedings in book form this year. The RMRC will announce the book's availability on its Web site at [www.rmrc.unh.edu](http://www.rmrc.unh.edu).

For more information on the conference and the use of recycled materials in transportation applications, contact Taylor Eighmy at RMRC, 603-862-1065 (fax: 603-862-3957; email: [t.eighmy@rmrc.unh.edu](mailto:t.eighmy@rmrc.unh.edu)).

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